

## CLAIMS

1. An isolated polypeptide having at least 80% sequence identity to the sequence SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6.

2. The polypeptide of claim 1, wherein said polypeptide is an active hBFIT1, hBFIT2, or mBFIT2, polypeptide.

3. The polypeptide of claim 2, having at least 90% sequence identity to the sequence SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

4. The polypeptide of claim 2, having at least 98% sequence identity to the sequence SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

5. An isolated polynucleotide encoding the polypeptide of any one of claims 1-4, or a complement of said polynucleotide.

6. An isolated polynucleotide encoding the polypeptide of any one of claims 1-4, or a complement of said polynucleotide, wherein said polynucleotide is not identical to SEQ ID NO:1, SEQ ID NO:3, or the complements thereof.

7. The isolated polynucleotide of claim 6, wherein said polynucleotide having at least 80% sequence identity to the sequence SEQ ID NO:1, SEQ ID NO:3, or SEQ ID NO:5, or a complement of said polynucleotide.

8. The polynucleotide of claim 7, having at least 90% sequence identity to the sequence SEQ ID NO:1, SEQ ID NO:3, or SEQ ID NO:5, or a complement of said polynucleotide.

9. The polynucleotide of claim 7, having at least 98% sequence identity to the sequence SEQ ID NO:1, SEQ ID NO:3, or SEQ ID NO:5, or a complement of said polynucleotide.

10. An antibody which specifically binds to the polypeptide of any one of claims 1-4.

11. A method of treating metabolic disease, comprising:  
administering to a subject a composition comprising a  
5 polynucleotide encoding the polypeptide of any one of claims 1-4, or the complement of said polynucleotide.

12. A method of treating metabolic disease, comprising:  
administering to a subject a composition comprising a  
polynucleotide to a patient in need thereof;  
10 wherein said polynucleotide has at least 80% sequence identity to the sequence SEQ ID NO:1, SEQ ID NO:3, or SEQ ID NO:5, or the complements thereof.

13. The method of claim 12, wherein said polynucleotide has at least 90% sequence identity to the sequence SEQ ID NO:1, SEQ ID NO:3, or  
15 SEQ ID NO:5, or the complements thereof.

14. The method of claim 12, wherein said polynucleotide has at least 98% sequence identity to the sequence SEQ ID NO:1, SEQ ID NO:3, or  
SEQ ID NO:5, or the complements thereof.

15. A method of quantifying an amount of BFIT in a composition,  
20 comprising:  
contacting the antibody of claim 10 with said composition.

16. The method of claim 15, further comprising measuring the amount of said antibody bound to BFIT in said composition.

17. A method of measuring BFIT agonist or antagonist activity of a  
25 compound, comprising:  
contacting said compound with a composition comprising a thioester and a polypeptide having at least 80% sequence identity to the sequence SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

18. The method of claim 17, wherein said polypeptide has at least 90% sequence identity to the sequence SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

5 19. The method of claim 17, wherein said polypeptide has at least 98% sequence identity to the sequence SEQ ID NO:2, SEQ ID NO:4, or SEQ ID NO:6.

20. A method of measuring BFIT transcription up-regulation or down-regulation activity of a compound, comprising:  
10 contacting said compound with a composition comprising a RNA polymerase and a polynucleotide encoding the polypeptide of any one of claims 1-4.

21. The method of claim 20, wherein said composition is in a cell.

22. A method of measuring BFIT translation up-regulation or down-regulation activity of a compound, comprising:  
15 contacting said compound with a composition comprising a ribosome and a polynucleotide encoding the polypeptide of any one of claims 1-4.

23. The method of claim 22, wherein said composition is in a cell.

20 24. The method of claim 17, wherein said thioester is an acyl-CoA thioester.

25. A vector, comprising a polynucleotide encoding the polypeptide of any one of claims 1-4, or a complement of said polynucleotide.

26. A cell, comprising the vector of claim 25.

25 27. A method of screening a patient for a metabolic disease, comprising:  
measuring BFIT gene expression in a tissue sample from the patient.

28. The method of claim 27, wherein said measuring BFIT gene expression is measuring an amount of BFIT polypeptide.

29. The method of claim 27, wherein said measuring BFIT gene expression is measuring an amount of mRNA encoding BFIT polypeptide.

5 30. A method of screening a sample for a BFIT mutation, comprising:

comparing a BFIT gene in the sample with SEQ ID NO 1, SEQ ID NO 3 or SEQ ID NO 5.

10 31. The method of claim 30, wherein the sample is a tissue sample from a patient having a metabolic disease.

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